EFFECTS OF LAYERED STRUCTURES ON ELECTROSTATIC PHENOMENA

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Abstract: This paper describes experiments with and practical applications of multilayered closed structures made from composite materials on electrostatic phenomena, mainly on the discharge of charged surface inside of such structure. Practical application of these findings is in a possible useful method of effective grounding of electrostatic charge accumulated on surfaces in industry.

Keywords: ESD discharge, Multilayered structure,

1 INTRODUCTION

The inspiration for this paper came from 30 years of research done by a man named Wilhelm Reich. He lived in the same period as Nikola Tesla and some of his experiments adopt the same approach as him. The discovery of the composite structure which is being described in this paper was by an accident. It was originally used for possible confinement of visible radiation emitted by biological cultures [3]. Eventually various effects have been discovered inside of the composite structure. For example, longer discharge times of a charged electrometer inside of the structure, constant temperature gradient under specific conditions [4], increased growth of plants and sprouting of seeds and increased absorption of UV radiation by water.

The effect of the longer discharge times of the electrometer have possible application in microelectronics from the point of view of electrostatic charge accumulated on the surfaces. The experiments conducted with the composite structure and its effects on the discharge times of the electrometer are described here. Based on the results, a prototype of a system that is able to conduct electrostatic charge from the surfaces has been created.

Theoretical background and mathematical models of the structure behavior is currently being formulated to better explain the effects that take place inside of it. The same applies for the prototype for conduction of electrostatic charge.

2 ACCUMULATOR WITH A COMPOSITE STRUCTURE

First the effects taking place inside of the accumulator should be described. The simplest experiments with the accumulator are done using a simple electrometer. This structure consists of a case and an electrode which are isolated from one another. When a charge is transferred to the electrode, the movable part is repelled because same charge is on both parts of the electrode. The electrometer used in these experiments was a Kolbe type manufactured by company Phywe. It is shown in figure 1.

Figure 1: Used Kolbe electrometer [1]

In theory, when the electrometer is charged, it slowly loses its charge thanks to the free ions in the air around it. Eventually the electrometer discharges completely. Structure around it should have no or minimal effect on the discharge times. However, when the charged electrometer is put inside of the layered accumulator, its discharge time can be up to 5 times longer than when it is left outside. This effect is present even when the layered structure is not fully closed. The discharge times are not as long as with fully closed one.

This experiment has been repeated several times to confirm the existence of the above described effect. It has been tested on several places in Czech Republic as well as abroad, particularly in Switzerland. The results can be seen in the table 1.

Experiment	Time of measurement	Temperature [°C]	Humidity [%]	Time outside	Time inside
1	11:23	17,3	43	38:23	48:47 (1,26x cube)
2	16:25	15,9	43-52	20:49/36:54	1:27:27(4,3x egg), 55:46 (1,49x, cube)
3	17:24	18,6	42-46	20:28	26:01 (1,29x, cube)
	17:55	17,5	46-54	11:22	17:18 (1,54x, egg)
4	18:10	24,0	23-32	42:20/41:34	43:53 (1,07x, egg), 35:20 (0,85x, cube)
	19:11	19,3	32-52	19:30/6:16	37:37 (1,94x, egg), ---
	20:25	19,0	52-58	16:51	Not measurable
5	16:04	21,3	30-45	8:58	24:35 (2,66x, egg)
	16:39	20,2	45-49	14:33	22:28 (1,57x, egg)

Table 1: Examples of measured times of discharge inside and outside of various structures

It has to be mentioned that relative air humidity has considerable effect on the discharge of the electroscope. If the humidity is higher than 50 %, the effect is entirely non existent and the electroscope discharges almost the same inside and outside of the accumulator.

The best result was measured when the measurements took place 1,860 meters above sea level in Swiss mountains. When there was no smog from the valley presents at this altitude, the discharge time was 4,3x times longer inside the accumulator compared to the outside.

3 PARTICULAR REALIZATION

The accumulator consists of a composite structure made mostly from a combination of organic dielectric layers and metallic layers. There are many possibilities of such materials so the particular combinations which were used are mentioned. There are some requirements on the layered structure:

1. The materials used should not be solid one piece,
2. The metallic material has to be weakly magnetic,
3. The layers should be as narrow as possible in order to amplify the effects,
4. Mostly naturally occurring materials should be used.

The possible layered structure is shown in picture 2. Several variants have been tested with various results. First the solid materials were used. Rounded structure from a combination of beeswax and cast iron has been tested.

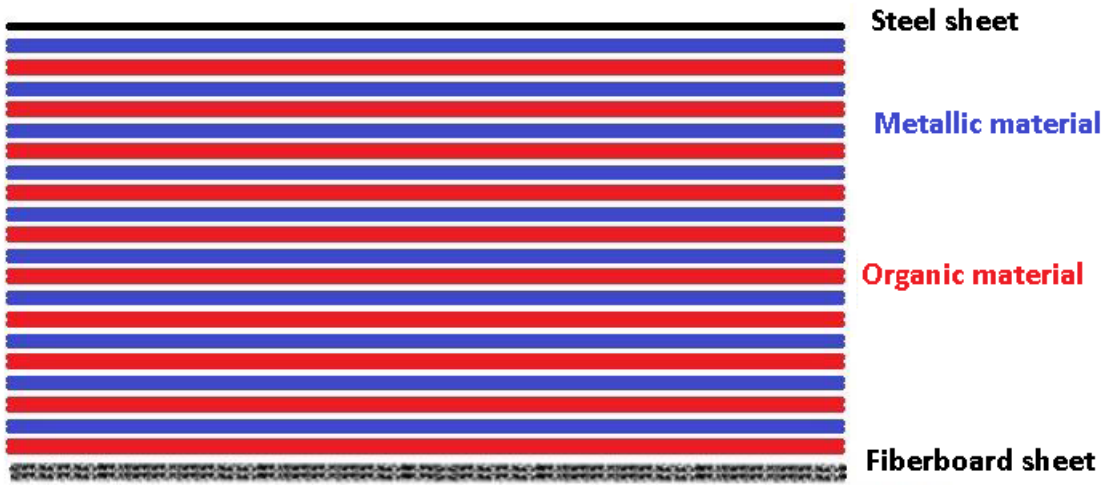

Figure 2: Basic concept of the composite structure [2]

The practical realization is shown in the picture 3. It has been observed that the solid materials do not produce very strong effect and if so, then only in very clean environment free of electromagnetic smog. This fact has been discovered by repeating experiments with discharging the electrometer inside and outside of the structure. The dimensions of the cube structure are 30x30x30 cm. The egg structure has 35 cm in height and 25 cm in width.

Figure 3: Practical realization of composite structure using steel wool and cork plates coated in beeswax

By completing these experiments, it has been shown that the effects are in fact present. Other prototypes have been made using different combination of materials. Instead of beeswax covered cork plates, merino wool has been used as the organic layer. Very fine steel wool has been used as a metallic layer. This adjustment has shown almost 80% increase in discharge times and better performance in environment with higher concentration of electromagnetic smog.

4 PRACTICAL USAGE

Another prototype has been developed using the results from the experiments with the first accumulators. The accumulative properties of the layered structure were tried to be used for conducting of electrostatic charge from the charged electrometer. The experiment was done inside of Faraday cage at VUT Brno. All the free ions have been sucked out of the room using a copper sphere connected to AC voltage source so the experiment was conducted in ion free environment. The electroscope was connected over the grounding socket to nano amper meter which was then connected to the ground. The block schematic is shown in figure 4. The particular realization is shown in figure 5.

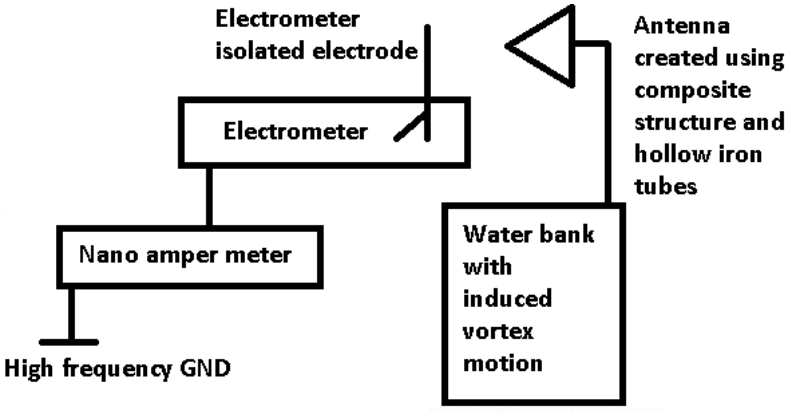

Figure 4: Block schematic of the used circuit

The expected behavior was that the electroscope is going to discharge much longer inside the ion free environment. This was confirmed to be true. The discharge was expected to be shorter when the prototype antenna was pointed towards the electrode of the electroscope. However, the result was opposite than was expected. The discharge time was actually almost two times longer. It took 2

hours and 35 minutes to discharge the electrometer without the influence of the antenna and 4 hours and 1 minute with the influence of the antenna. There was a constant current of 30 nA drawn from the earth socket which flown towards the electrometer. The chassis of the electrometer was constantly recharged by this current. Thanks to this fact, the electrometer discharged much longer than was expected.

Figure 5: Layout of the experiment inside of Faraday cage

5 CONCLUSION

In this paper, a set of 80 experiments is described using composite enclosed structures, inside of which longer discharge of charged electrometer occurs. The phenomena of longer discharge times has been extensively tested in various environments and environmental conditions. It has been proven that this effect really exists inside of such structure. Consequently, the effects produced by the composite structure has been used for creating a prototype for conducting electrostatic charge from a charged electrometer. The results have shown that the charge is indeed conducted and the prototype is currently further developed. Also, a mathematical model of the effects in the composite structures as well as the functionality of the prototype antenna is being currently formulated.

REFERENCES

[1] Electroscope, Kolbe type, Electrometer. In: *Phywe Excelence in Science* [online]. Germany: PHYWE Systeme GmbH und Co., 2018 [cit. 2019-03-15]. Dostupné z: https://www.phywe.com/en/electroscope-kolbe-type-electrometer.html

[2] Reichs Orgone accumulator Box. In: *Orgonite Info* [online]. Germany: Orgonite Info, 2018 [cit. 2019-03-15]. Dostupné z: http://www.orgoniteinfo.com/what-is-orgonite.php

[3] REICH, Wilhelm, EDITED BY MARY HIGGINS AND CHESTER M. RAPHAEL a TRANSLATED FROM THE GERMAN BY DEREK AND INGE JORDAN. *The bion experiments on the origin of life*. New York: Farrar, Straus, Giroux, 1979. ISBN 978-037-4514-464.

[4] DEMEO, James. Experimental confirmation of the Reich Orgone accumulator thermal anomaly. *Subtle Energies and Energy Medicine* [online]. 2009, **20**(3), 17-32 [cit. 2017-04-26]. Dostupné z: https://www.academia.edu/3677742/Experimental_Confirmation_of_the_Reich_Orgone_Accumulator_Thermal_Anomaly